nation to develop into infection. The antibiotic therapy consists of penicillin "distaquaine" fortified, 300,000 units, and streptomycin 0.5 g. both three times a day for four days. The graft is inspected on the fourth or fifth post-operative day and the mould removed. Any excess skin is removed and a piece of cotton-wool is placed over the grafted area to keep it dry. The patient is discharged on the fifth or sixth day post-operatively with the wound healed.

Goodsall (1892) practised sphincterotomy with good results. He did not excise the ulcer but simply cut through the subcutaneous sphincter. The wound healed by secondary intention. In patients with chronic fissures who are unwilling to undergo operation this process has more to commend it than digital dilatation.

Discussion

An anal fissure is a non-malignant condition of the anus, causing acute discomfort to the patient. He asks for relief, but is reluctant to accept a treatment that demands an absence from work for any prolonged period.

Acute uncomplicated fissures not uncommonly respond to more conservative measures. The patient is advised of the nature of his condition, suitable adjustment is made to his diet to give a bulky but soft stool, and digital dilatation is practised; an injection of local analgesia often helps to break the vicious circle by enabling the surgeon to dilate the anus gently.

Chronic fissures, particularly those complicated by some degree of infection of the deeper tissues, are unlikely to obtain permanent relief by such measures. If an anaesthetic is to be given to the patient, the fissure is best excised so that recurrence is prevented. If there are associated haemorrhoids, these should be removed. After excision of the fissure and division of the subcutaneous sphincter the wound can be left open to heal by secondary intention, but this prolongs the convalescence, demands daily dressings and keen appreciation by the surgeon of the importance of a flat wound until completely covered by epithelium, and still leaves a scar which as it matures might be responsible for recurrence of the fissure. Therefore I favour primary skin-grafting to the wound after the fissure has been excised (Hughes, 1952). The period in hospital and that of convalescence are much shortened, no dressings are required after the grafted area has been inspected, the absence of granulation tissue eliminates fibrosis, and the chances of recurrence of the fissure are slight. The results of primary skin-grafting have been excellent: all 12 cases subjected to excision of the anal fissure combined with primary skin-grafting have had a 100% "take" and all have left hospital within a week of the operation with the fissure removed and the wound healed.

Summary

The aetiology and pathological and clinical features of anal fissure have been briefly reviewed. The acute but otherwise uncomplicated fissure may respond to treatment administered in consulting-rooms, but chronic fissures, particularly those complicated by infection, superficial or deep, usually require more radical treatment. The fissure should be excised, the subcutaneous sphincter divided, and a primary split-thickness skin graft applied. The fissure is removed and the wound completely healed during a stay of six to seven days in hospital.

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INTESTINAL PROTOZOA IN MENTALLY DEFICIENT CHILDREN

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Specimens of faeces from mentally deficient children in the wards of Harperbury Hospital, Shenley, Hertfordshire, were examined by various methods in order to ascertain the degree of infections by intestinal protozoa.

This paper gives particulars of the methods used and the results obtained in a "pilot" survey which was undertaken during September and October, 1952.

Materials and Methods

The total number of mentally deficient children currently treated at Harperbury Hospital was 56. Specimens of faeces for this survey were secured from 50. All those examined were male. Their age distribution and the duration of their stay in hospital were as follows:

Age	No. of Children	Time in Hospital	No. of Children
5 to 7 years	.. 10	Less than 3 years	.. 8
8 to 10 "	.. 15	From 3 to 5.9 years	.. 21
11 to 13 "	.. 18	From 5 to 8.9 years	.. 18
14 to 17 "	.. 7	Over 9 years	.. 3
Mean age of the group 10 years		Mean duration, 5.36 years	

The children came from the London and Middlesex areas, and none had resided in a tropical or subtropical country. There was some contact between them and outside because they attended school. Intestinal disturbances were not uncommon.

Specimens were placed in new clean waxed cream cartons and carried by messenger to the London School of Hygiene and Tropical Medicine. When received they were usually 3 to 5 hours old, but in a few instances they were from 10 to 12 hours old. Most of the specimens were formed. Each batch was inoculated at once in culture media, then examined directly and after concentration. Particulars of the techniques follow.

Direct Examination.—In addition to the direct films in saline and iodine (double strength Gram's iodine) a third film was made in a drop of 1% aqueous solution of eosin. This procedure (Kuenen and Swellengrebel, 1913), besides improving the efficiency of the direct examination (three films seen instead of the usual two), has some other advantages. The eosin solution has the property of staining everything in the stool pink, except living protozoa. On this pink background the living protozoa (and their cysts) stand out prominently as colourless, pearl-like, refractile bodies which can be recognized very easily even with the 2/3 objective. Moreover, the chromatoid bodies of the cysts of *Entamoeba histolytica* (invisible in the iodine preparation) are much more distinguishable in eosin films than in ordinary saline preparations. Each of the three films of the direct method was examined for about 10 minutes, first under the 2/3 objective and then under the 1/6 (with a $\times 10$ eyepiece).

Concentrated Specimens.—The original centrifugal flotation technique of Faust *et al.* (1939) was modified in order to facilitate detection of cysts of the smaller intestinal protozoa. Tests were made with denser solutions of zinc sul-

phate, the specific gravity of which was increased by steps of 0.02. Finally it was found that the specific gravity of the zinc sulphate solution could be increased from 1.18 to an optimum of 1.28, which corresponds to a 51% solution. This new centrifugal flotation technique can be summarized as follows:

1. Take a piece of faeces the size of a walnut and emulsify it in tap-water, using a pestle and mortar to ensure a uniform suspension.

2. Strain off large particles by pouring the solution through a copper wire sieve of about 40 mesh to the inch into a bowl (wet the sieve before use).

3. Centrifuge the emulsion at about 3,000 revolutions a minute for about three minutes to obtain a deposit.

4. Pour off supernatant fluid and break up deposit with a glass rod.

5. Half fill the tube with 51% zinc sulphate, stir with the glass rod and complete suspension by gently inverting the tube after closing the mouth with the thumb or cork. Try to avoid the formation of bubbles, as these will interfere with the final "film."

6. Fill the tube nearly to the brim with the zinc sulphate solution and mix again by gently inverting the tube several times as before.

7. Centrifuge at about 3,000 revolutions for three minutes and allow the tubes to come to rest gradually without disturbance.

8. Remove a portion of the film on the top of the fluid by a loop bent to lie in a horizontal position and deposit a loopful on each of two slides.

9. Add a little 1% eosin to one and Lugol's iodine to the other, mix in and cover with a coverslip.

N.B.—Do not delay the dilution in eosin and iodine after the cysts have been exposed to zinc sulphate, as they tend to collapse after about 15 minutes in this strong solution.

Each of the two slides of the concentrated specimen was examined for 10 minutes, bringing the total time devoted to the examination of every specimen, either positive or negative to approximately 50 minutes. A certain number of faecal specimens were examined more than once by the above methods.

Cultivation.—As soon as the specimens were received they were inoculated in culture media—Dobell's HSre medium, or modified Tanabe's medium for intestinal flagellates, or Rao's (1951) modified liver infusion agar medium. A loopful of sterile rice starch was added to the culture tubes upon inoculation, and the whole work was performed under sterile conditions. Cultures were examined after 24 hours at 37° C., and in some instances after 48 hours. Sub-inoculations and isolation of colonies of protozoa were made only in exceptional cases.

Permanently Stained Preparations.—These were made in a few selected cases. The staining methods used were Heidenhain's iron haematoxylin and Mallory's phosphotungstic haematoxylin, as modified by one of us (W. C.) (see Hoare, 1949). Dry preparations were made of some flagellates from cultures, and these were stained by Leishman's and/or Giemsa's method.

Results of Direct Film and Concentration

Table I gives detailed results of the general one-stool examination in direct film and after concentration, cultivation, and staining of permanent preparations. Cysts of four species of amoebae and two species of flagellates were detected during this survey. No active forms either of amoebae or of flagellates were found. Of the 50 specimens

TABLE I.—Protozoa found in Faecal Specimens from Mentally Deficient Children

No.	Age in Years	Time in Hospital	Results			
			In Direct Film	Additional Findings		Total Findings
				After Concentration	After Cultivation	
1	8	3.3 years	Neg.	Neg.	Neg.	Neg.
2	14	8.6 "	E.c.	—	E.h. Ent.h.	E.c. E.h. Ent.h.
3	7	5.0 "	I.b. E.n.?	E.n. E.c.	Ent.h.	I.b. E.n. E.c. Ent.h.
4	11	5.7 "	Neg.	Neg.	Ent.h.	Ent.h.
5	15	6.3 "	Neg.	Neg.	Neg.	Neg.
6	9	2 days	Neg.	Neg.	Neg.	Neg.
7	7	4.0 years	E.h. G.i. E.n. E.c.	I.b.	—	E.h. G.i. E.n. E.c. I.b.
8	5	45 days	E.c. E.h. Small cyst?	I.b.	—	E.c. E.h. I.b.
9	12	8.1 years	Neg.	Neg.	Neg.	Neg.
10	7	1.4 "	E.c.?	E.c.	—	E.c.
11	12	8.3 "	Neg.	Neg.	Neg.	Neg.
12	13	8.3 "	E.h.?	E.h. I.b. E.c. C.m.	—	E.h. I.b. E.c. C.m.
13	16	13.8 "	I.b.	E.c. E.h.	—	I.b. E.c. E.h.
14	6	3.3 "	E.n.	E.c.	—	E.n. E.c.
15	6	3.3 "	Neg.	Neg.	Neg.	Neg.
16	7	2.3 "	E.c.	Not made	—	E.c.
17	11	3.8 "	Neg.	Neg.	Neg.	Neg.
18	13	8.4 "	Neg.	Neg.	Neg.	Neg.
19	12	7.7 "	G.i. E.c.	—	—	G.i. E.c.
20	9	8.2 "	Neg.	Neg.	Neg.	Neg.
21	8	6.1 "	Neg.	Neg.	Neg.	Neg.
22	9	3.4 "	G.i.	—	—	G.i.
23	12	7.8 "	G.i.	E.c. I.b.	Ent.h.	G.i. E.c. I.b. Ent.h.
24	17	13.8 "	Neg.	E.c.	—	E.c.
25	13	8.4 "	E.h. E.c.	—	—	E.h. E.c.
26	8	2.9 "	Neg.	Neg.	Neg.	Neg.
27	13	6.3 "	Neg.	Neg.	Neg.	Neg.
28	8	3.3 "	E.h. I.b.	E.c. C.m.	—	E.h. I.b. E.c. C.m.
29	9	6 months	Neg.	Neg.	Ent.h.	Ent.h.
30	12	7.9 years	Neg.	Neg.	Neg.	Neg.
31	10	7.8 "	E.c. G.i.	E.h.	—	E.c. G.i. E.h.
32	13	3.2 "	E.c.	—	Ent.h.	E.c. Ent.h.
33	8	3.3 "	E.n.	—	E.h.	E.n. E.h. G.i.*
34	13	4.3 "	E.c.	—	—	E.c.
35	7	3.1 "	Neg.	Neg.	Neg.	Neg.
36	5	11 months	E.h.	—	Ent.h.	E.h. Ent.h.
37	14	5.4 years	E.n. E.c.	—	—	E.n. E.c.
38	11	4.9 "	E.c.	—	Ent.h.	E.c. Ent.h.
39	12	5.9 "	Neg.	Neg.	Neg.	Neg.
40	10	4.6 "	E.n. E.h.	—	—	E.n. E.h.
41	8	5.7 "	E.c.	E.h.	—	E.c. E.h.
42	8	1.2 "	E.c.	E.n.	E.h.	E.c. E.n. E.h.
43	13	7.5 "	E.c. Small cyst?	E.n.	—	E.c. E.n.
44	8	4.8 "	E.h. Small cyst?	I.b. E.c.	—	E.h. I.b. E.c.
45	10	6.5 "	E.c. E.h.	I.b.	Ent.h.	E.c. E.h. I.b. Ent.h.
46	12	5.1 "	E.c.	C.m.	—	E.c. E.n.* C.m.
47	14	6.5 "	E.c.	—	—	E.c.
48	11	9.0 "	E.h.	E.c.	—	E.h. E.c.
49	14	6.7 "	E.c.	—	Ent.h.	E.c. Ent.h.
50	6	3.5 "	G.i. E.c.	E.m.	—	G.i. E.c. E.n.

* Revealed by Heidenhain's haematoxylin staining of a wet-fixed film.

E.c. = *Entamoeba coli*. E.h. = *E. histolytica*. E.n. = *Endolimax nana*. I.b. = *Iodamoeba butschlii*. G.i. = *Giardia intestinalis*. C.m. = *Chilomastix mesnili*. Ent.h. = *Enteromonas hominis*.

examined, 30 were positive for one or more species of protozoa in the direct film (60%). After concentration the number of positive specimens increased to 33 out of the 49 examined (67%). In no case did the direct examination reveal anything that the examination of the concentrated specimen did not, and often the latter technique changed a doubtful into a certain result.

Table I shows the following incidences: *E. coli*, 29 (58%); *E. histolytica*, 16 (31%); *E. nana*, 10 (20%); *I. butschlii*, 9 (18%); *G. intestinalis*, 7 (14%); *C. mesnili*, 3 (6%); *Ent. hominis*, 10 (20%).

The importance of the concentration technique is shown even more by the increased number of species of protozoa detected (Table II).

TABLE II

No. of Specimens Positive for	Direct Film	Concentration
1 species of protozoa	21	11
2 " " " " " " " " " " " "	10	10
3 " " " " " " " " " " " "	0	9
4 " " " " " " " " " " " "	1	2
5 " " " " " " " " " " " "	0	1
Average No. of species of protozoa per positive specimen	1.4	2.2

The relative efficiency of direct film examination, as compared with concentration, is given in Table III. (The figures in parentheses represent percentages of the first column when the figures of the third are taken as 100%.)

TABLE III.—Number of Specimens in which Cysts were Detected

	Direct Film	Concentration
<i>E. coli</i>	18 (64%)	28
<i>E. histolytica</i>	9 (60%)	15
<i>E. nana</i>	5 (50%)	10
<i>I. butschlii</i>	3 (33%)	9
<i>G. intestinalis</i>	6 (100%)	6
<i>C. mesnili</i>	0 (0)	3

Cultivation

(a) No. 33 (Table I) showed trophozoites of *E. histolytica* (not found before).

(b) Nos. 3, 4, 23, 29, 32, 36, 38, 45, and 49 showed active forms of small flagellates which could not be identified with certainty. In order to identify them in at least one instance, a culture of No. 2 in Dobell's HSre medium, showing small flagellates, was subinoculated in the same medium, and for some time, until the organisms were numerous enough to enable us to make permanent preparations. They were also examined under dark-ground illumination, and were eventually diagnosed as *Enteromonas hominis*.

(c) Nos. 2 and 42 showed, in addition to the "small" flagellates mentioned above, trophozoites of *E. histolytica*. No. 42 had been negative previously for this organism. It should be noted that Nos. 4 and 29, which were found negative when examined by other techniques, proved positive after cultivation, thus increasing the overall incidence of protozoa found during this survey to 70% of the specimens, and the proportion of specimens showing *E. histolytica* was raised by these cultural methods to 34%. *Blastocystis hominis* was a very common contaminant of the cultures.

Permanent Preparations

Permanently stained preparations were made of about one-fifth of the specimens obtained, using one or more of the staining methods mentioned. Only when examination was prolonged for over 30 minutes (under the 1/12 objective) was it possible to detect species of protozoa not found previously. Thus *G. intestinalis* cysts and *E. nana* cysts were added to the previous results of Nos. 33 and 46 respectively. The size of the *E. histolytica* cysts was not measured as a routine, but most seemed to be of the small variety (7 μ to 12 μ).

Discussion

This small survey did not pretend to find out the true incidence of infection of intestinal protozoa, which would have required the examination of repeated specimens. However, specimens from twelve children were examined twice, from two children three times, and from a further two children four times; three additional infections of *E. histolytica* were thereby discovered, bringing the apparent total incidence of this species to 40%. This figure is probably the highest recorded in the United Kingdom, where in persons who had never resided abroad it has varied from 1.6% (Morton *et al.*, cited by Hoare, 1950) to 10% (Dobell *et al.*, cited by Hoare, 1950). In a group of men of the R.A.F. previously stationed in India, some of whom had given a past history of dysentery, Rickards (1949) estimated a true incidence of from 21.99 to 36.65% (*E. histolytica*). High rates are usual in institutions for mental deficient, and even higher rates than the present ones were found by Tobie *et al.* (1951) in Wassaic State School, Wassaic, New York, U.S.A., where the following incidence (direct film and concentration combined) was determined: *E. coli*, 76%; *E. histolytica*, 59%; *E. nana*, 65%; *I. butschlii*, 61%; *G. intestinalis*, 38%; *C. mesnili*, 40%.

The importance of *E. histolytica* with respect to public health remains doubtful in the absence of clear knowledge of the pathogenicity of the species. It is suggested that the high incidence of this parasite (and others) in patients in mental institutions, as compared with that in the general population, is probably due to close contact between people with unhygienic personal habits.

Conclusions and Summary

A pilot survey for intestinal protozoa was carried out with faecal specimens from mentally deficient children in Harperbury Hospital, Shenley, Hertfordshire, during which, besides direct examination and cultivation, a new concentration technique was used.

The results of this survey showed a very high infection rate among these children, most of whom were found to harbour from one to as many as five different species of intestinal protozoa. The rate of infection with *E. histolytica* was found to be 40%, but it is believed that its incidence may be even higher.

A rare species of flagellate, *Enteromonas hominis*, was isolated in culture media from one specimen and maintained by subinoculation in Dobell's medium.

This work was done under the guidance and direction of Professor P. C. C. Garnham, Director of the Department of Protozoology, to whom we are indebted for the facilities provided for this investigation. We are also indebted to Dr. E. D. Taylor, medical superintendent, Harperbury Hospital, for the supply of specimens of faeces and epidemiological information on the mentally deficient children of his hospital.

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At the end of March this year there were 9,413 blind persons on the registers of the local authorities in Scotland, the highest figure ever recorded. The increase over last year of 294 people is accounted for almost entirely in the 70-years-and-over age group, which now comprises 44% of the total. The total number of children under 16 registered as blind was 184, 27 of whom were new registrations.